Bahrain Medical Bulletin, Vol. 35, No. 3, September 2013

Acetabulum and Pelvis Fractures: A Retrospective Study

Badriya Toorani, MD, CABS-Ortho* Ebrahim Khamis, MD, CABS-Ortho**

Background: Fractured acetabulum and pelvis are serious injuries. In the last century, conservative treatment was the most common. Conservative approach carries high incidence of morbidity and mortality. Over the last two decades, operative treatment has become the treatment of choice.

Objective: The aim of this study is to compare the outcome of conservative and operative treatment of fractured acetabulum and pelvis.

Design: A retrospective study.

Setting: Salmaniya Medical Complex (SMC), Bahrain.

Method: The hospital records and radiographic images for all patients with fractured acetabulum and pelvis admitted to SMC from January 2000 to March 2005 were reviewed. Eighty-one patients were included in the study, 61 males and 20 females with a mean age of 41 years (ranges from 18 to 68). Patients under the age of 18 years were excluded. Injuries were classified according to Tile's comprehensive classification.

Result: The main causes for injuries were as follows: 40 (49.4%) patients due to a fall from height and 37 (45.7%) due to road traffic accidents (RTA). Sixty-five out of 66 were treated conservatively from January 2000 to July 2004. Ten out of 15 were treated operatively from August 2004 to March 2005. The operated group had early mobilization, less complications and shorter hospital stay.

Conclusion: Operative treatment for acetabulum and pelvis fractures is technically demanding, but it has better outcome than conservative treatment.

Bahrain Med Bull 2013; 35(3):

The pelvis is a complex anatomical structure formed of the sacrum, coccyx and the innominate bones. The three innominate bones fuse at the acetabulum that articulates with the head of the femur to form the hip joint. The pelvis contains and protects many important vessels, nerves, bladder, reproductive organs and viscera. The bony components of the pelvis are supported and held together by strong ligaments.

---

* Consultant Orthopedic Surgeon
** Chief Orthopedic Resident
Salmaniya Medical Complex
Kingdom of Bahrain
Email: badriyatoorani@hotmail.com

Fracture of the pelvis in old osteoporotic patients may occur from low energy trauma as a fall at home. On the other hand, fracture of the pelvis in young adults is usually due to high energy trauma as RTA. Fractured pelvis with high energy trauma may be associated with multiple injuries which increase the risk of morbidities and mortalities.

It is a well-known fact that all fractures heal, whether treated conservatively or operatively, yet the fracture of the acetabulum treated conservatively heals with malunion. The hip is a ball and socket joint, malunion becomes incongruent and leads to early osteoarthritis[1-3]. Therefore, patients with pelvic and acetabulum fractures need comprehensive assessment and appropriate treatment.

It is widely accepted that open-reduction and internal fixation (ORIF) of displaced acetabular and pelvic fractures is the method of treatment. There are several types of acetabular fractures which demand challenging surgical approaches and techniques[4-6]. The main obstacle in surgical correction is appropriate exposure of the fracture and ability to reduce it. In 1961, Letourneau and Judet first preformed ORIF for fractured acetabulum and showed a better outcome[7,8].

Tile's comprehensive classifications are usually used for these fractures[9-11]. The surgical approaches are usually anterior ilioinguinal, posterior Kocher-Langenbeck and Pfannenstiel[12-14].

The aim of this study is to evaluate our experience and approach to acetabular and pelvic fractures treated either operatively or conservatively at Salmaniya Medical Complex.

METHOD

A retrospective data base analysis of all the acetabular and pelvic fractures at SMC from January 2000 to March 2005 was done.

These patients were screened again for age; four patients below 18 years were excluded. Eighty-one patients comprised the study group.

The following data were recorded: age, sex, date of admissions (date of injury), date of discharge, Tile's comprehensive classification, mechanism of injury and treatment were identified (conservative or operative). The information was entered into a Microsoft excel spread sheet for analysis.

Tile's classifications were used based on review of each individual X-ray. The surgical approaches used in this study were anterior ilioinguinal, posterior Kocher-Langenbeck and Pfannenstiel.

RESULT

Eighty-one patients with acetabular and/or pelvic fractures were included in the study. Sixty-one (75.3%) were males and 20 (24.7%) were females. The age range was 18-78 years; the mean age was 41 years. According to the Tile's comprehensive classification, the distribution of injuries can be seen in tables 1 and 2 and figures 1 and 2. Each table represents the distribution for both acetabular and pelvic injuries (labeled accordingly). Some patients had both injuries, but were separated since each injury has its own classification as well as its own treatment and management[15-18].

Table 1: Patients Distribution According to Tile's Comprehensive Classification of Pelvic Injuries

Classification Subtype	Number and Percentage
A1	3 (8.3)
A2	8 (22.2)
A3	3 (8.3)
B1	15 (41.7)
B2	5 (13.9)
B3	0 (0)
C1	0 (0)
C2	2 (5.5)
C3	0 (0)
Total	36 (100)

Tile's Classification of Pelvic Injuries	
Type A:	Stable pelvic injury
A1:	Avulsion of the innominate bone
A2:	Stable iliac wing fracture of stable minimally displaced ring fractures
A3:	Transverse fractures of the sacrum and coccyx
Type B:	Partially stable
B1:	Open-book injury
B2:	The lateral compression injury
B3:	Bilateral B injuries
Type C:	Complete unstable
C1:	Unilateral
C2:	Bilateral, one side B, one side C
C3:	Bilateral C lesions

Table 2: Patients Distribution According to Tile's Comprehensive Classification of Acetabular Injuries

Classification subtype	Number and Percentage
A1	20 (44.4)
A2	10 (22.2)
A3	5 (11.1)
B1	4 (8.9)
B2	0 (0)
B3	0 (0)
C1	5 (11.1)
C2	1 (2.2)
C3	0 (0)
Total	45 (100)

Tile's Classification of Acetabular Injuries	
Type A:	Partial articular fracture, one column involved
A1:	Posterior wall fracture
A2:	Posterior column fracture
A3:	Anterior wall or anterior column fracture
Type B:	Partial articular fractures (transverse of T-type fractures, both column involved)
B1:	Transverse fracture
B2:	T-shaped fracture
B3:	Anterior column plus posterior hemitransvere
Type C:	Complete articular fracture (both-column fracture; floating acetabulum)
C1:	Both – column fracture, high variety
C2:	Both – column fracture, low variety
C3:	Both-column fracture involving the sacroiliac joint.

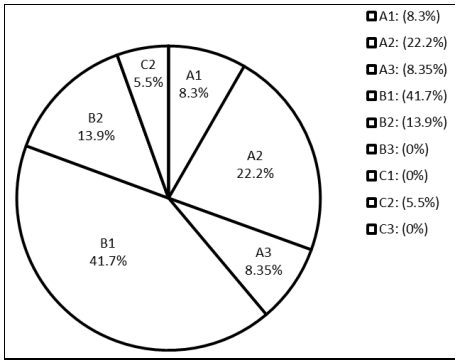

Figure 1: Pie Chart Showing Patient Distribution According to Pelvic Injuries

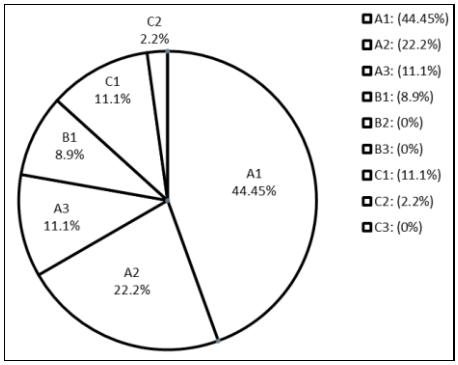

Figure 2: Pie Chart Showing Patient Distribution According to Acetabular Injuries

The surgical approaches used were the Pfannenstiel, anterior ilioinguinal and posterior Kocher-Langenbeck, see figures 3-6[19,20].

Figure 3: A2 Posterior Column Fracture

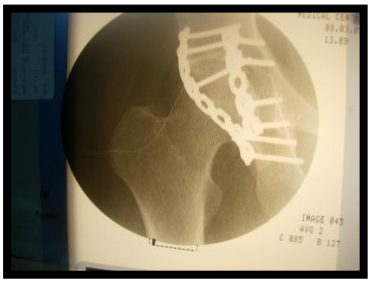

Figure 4: Fixation Using Kocher-Langenbeck Approach

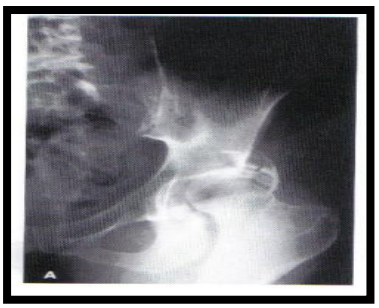

Figure 5: A1 Posterior Lip Fracture

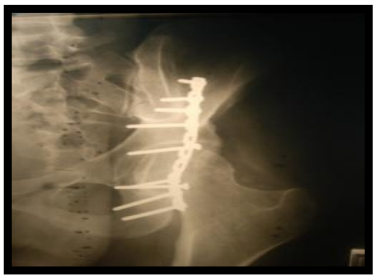

Figure 6: Fixation Using Kocher-Langenbeck Approach

The injuries were due to road traffic accidents in 37 (45.7%) patients, fall in 40 (49.4%) and 4 (4.9%) in others.

The patients were divided into two categories: pelvic and acetabular injuries, further subdivided into two groups, those admitted and discharged between January 2000 till July 2004 and those in August 2004 till March 2005. Conservative and operative treatments were compared in the two groups, see tables 3 and 4.

Table 3: Conservative versus Operative Treatment from January 2000 - July 2004

Category	Conservative	Operative
	Number and Percentage	
Pelvic Injuries	29 (100%)	0 (0%)
Acetabular Injuries	36 (97.3%)	1 (2.7%)

Table 4: Conservative versus Operative Treatment from August 2004 - March 2005

Category	Conservative	Operative
	Number and Percentage	
Pelvic Injuries	4 (57.1%)	3 (42.9%)
Acetabular Injuries	1 (12.5%)	7 (87.5%)

As shown in table 4, there was a significant change in the percentage of operative treatment for both pelvic and acetabular fractures. These results on their own do not prove anything except that the orthopedic surgeons were more aggressive in their treatment and management during August 2004 to March 2005. Significant and appreciable correlation was found between the hospital stay for conservative and operative cases, see table 5.

Table 5: Average Hospital Stay

	Pelvis	Acetabulum
Conservative treatment	28 days	29 days
Operative treatment	21 days	21 days

During the study, two complications were encountered; one patient had drop foot, but the nerve recovered completely and the second patient expired due to respiratory distress syndrome.

DISCUSSION

In this study, the advantages and disadvantages of both operative and conservative treatments

were clearly identified. Early mobilization of the patient and quicker return to pre-trauma activity level are advantages of anatomical reduction of the fracture. The disadvantages of operative treatment were the intraoperative complications, including blood loss, sciatic nerve injury (posterior approach), femoral nerve and vessel injury (anterior approach) and infection. The long-term disadvantages are non-union and implant failure[4,9].

In conservative treatment there was an increased morbidity due to immobilization for 6 weeks or until the fracture heals, wasting and atrophy of the lower limb muscles, bed sores and chest infections.

Current concepts emphasize that even with a stable fracture, operative treatment is recommended when the fracture requires more than 10 days of immobilization in bed with traction[6,11,15].

CONCLUSION

There was a decreased morbidity and improved prognosis in patients with pelvic or acetabular fractures who were treated surgically. Therefore, we recommend the operative treatment for such fractures over the conservative management.

Author contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential conflicts of interest: None.

Competing interest: None. **Sponsorship:** None.

Submission date: 16 April 2013. **Acceptance date**: 23 May 2013.

Ethical Approval: Orthopedic Department, Salmaniya Medical Complex.

REFERENCES

1. Hefny MS, Dickinson AW, Giles AE, et al. The Aspherical Human Hip: Implication for Early Osteoarthritis. Stud Health Technol Inform 2013; 184: 195-201.
2. Hunter JC, Brandser EA, Tran KA. Pelvic and Acetabular Trauma. Radiol Clin North Am 1997; 35(3): 559-90.
3. Pun SY, O'Donnell JM, Kim YJ. Non-arthroplasty Hip Surgery for Early Osteoarthritis 2013; 39(1): 189-202.
4. O'Neill F, Leonard M, Lui D, et al. Pelvic and Acetabular Fractures. Ir Med J 2012; 105(9): 306.
5. Tile M, Helfet D, Kellam JF. Fractures of the Pelvis and Acetabulum. 3rd ed. PA, USA: Lippincott Williams & Wilkins; 2003: 130-67.

6. Jeffcoat DM, Carroll EA, Huber FG, et al. Operative Treatment of Acetabular Fractures in an Older Population through a Limited Ilioinguinal Approach. J Orthop Trauma 2012; 26(5): 284-9.
7. Letournel E. The Treatment of Acetabular Fractures through the Ilioinguinal Approach. CLinOrthop 1993; 292: 62-76.
8. Giannoudis PV, Kanakaris NK, Dimitriou R, et al. The Surgical Treatment of Anterior Column and Anterior Wall Acetabular Fractures: Short- to Medium-term Outcome. J Bone Joint Surg Br 2011; 93(7): 970-4.
9. Letournel E. Fractures of the Acetabulum. A Study of a Series of 75 Cases. 1961. Clin Orthop Relat Res 1994; (305): 5-9.
10. Muller ME, Nazarian S, Koch P, et al. The Comprehensive Classification of Fractures of Long Bones. 1st ed. Springer Verlage: Verlin; 1990: 1-202.
11. Matta JM, Mehne DK, Roffi R. Fractures of the Acetabulum. Early Results of Prospective Study. CLin Orthop 1986: (205): 241-50.
12. Vallier HA, Cureton BA, Ekstein C, et al. Early Definitive Stabilization of Unstable Pelvis and Acetabulum Fractures Reduces Morbidity. J Trauma 2010; 69(3): 677-84.
13. Kobziff, Lydia MS, BSN, et al. Orthopaedic Nursing. Traumatic Pelvic Fractures 2006; 25(4): 235-41.
14. Leenen LP, van der Werken C, Schoots F, et al. Internal Fixation of Open Unstable Pelvic Fractures. J Trauma 1993; 35(2): 220-5.
15. Eckroth-Bernard, Davis JW. Management of Pelvic Fractures. Curr Opin Crit Care 2010; 16(6): 582-6.
16. Matta JM. Indications for Anterior Fixation of Pelvic Fractures. Clin Orthop Relat Res 1996; (329): 88-96.
17. Rubel IF, Kloen P, Bornes O, et al. External Fixation for Pelvic Ring Injuries. Techniques in Orthopedics 2002; 17(2): 221-7.
18. Goldstein A, Phillips T, Sclafani SJ, et al. Early Open Reduction and Internal Fixation of the Disrupted Pelvic Ring. J Trauma 1986; 26(4): 325-33.
19. Karunakar MA, Le TT, Bosse MJ. The Modified Ilioinguinal Approach. J Orthop Trauma 2004; 18(6): 379-83.
20. Jeffcoat DM, Carroll EA, Huber FG, et al. Operative Treatment of Acetabular Fractures in an Older Population through a Limited Ilioinguinal Approach. J Orthop Trauma 2012; 26(5): 284-9.